Exploring the distributional impact of investment in the port sector on households in Mauritius: A social accounting matrix approach

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Abstract

Research on the role that growth in the Ocean Economy can play on poverty reduction and income inequality has been limited to date. Using a Social Accounting Matrix framework this paper examines the distributional effects of investment in the port sector on employees and households in Mauritius. Two investment scenarios (conservative, US$1089 million and optimistic, US$1332 million) are considered. The results suggest that in the short term, investment in the development of the port sector would have an overall positive impact on the Mauritian economy. Poor and lower middle-income households would receive a very small positive impact, as would employees with lower education levels. However, in the medium to long term, impacts at the household level would be uneven with wealthy households and employees with university education receiving the greatest benefit. These results suggest the need for complementary redistributive policies.

1. Introduction

An upper middle-income country, Mauritius has one of the highest annual economic growth rates across Africa (Sharpley & Naidoo, 2010; Fauzel et al., 2016; Svirydzenka, & Petri, 2017). However, while economic growth remains strong, Mauritius is increasingly experiencing high levels of unemployment, underemployment, and excess capacity (Sharpley & Naidoo, 2010; Svirydzenka, & Petri, 2017). At the same time, official income statistics from the Mauritian Statistics Office indicates that while household income in Mauritius has increased across all income quintiles over the last 10 years, the highest 20% of households shared 47.5% of the total income while those in the lowest 20% shared only 5.3% of the total income (Household Budget Survey, 2012). Recognising that increasing inequality has the potential to reduce the quality of growth and increase social unrest, the Mauritian government is interested in assessing how effective its current fiscal policies are in promoting growth, expanding opportunities, accelerating poverty reduction and decreasing income inequality (Sharpley & Naidoo, 2010; Fauzel et al., 2016).

The ocean and its future development are increasingly seen as being critical to delivering smart, sustainable and inclusive growth globally (OECD, 2016). Mauritius manages a maritime zone of 2.3 million km^2, with an Exclusive Economic Zone of 1.96 million square kilometres

and a continental shelf of 396,000 km^2 co-managed with the Republic of Seychelles. The ocean territory contributes significantly to the wealth of Mauritius (The Ocean Economy: A Roadmap for Mauritius, 2013). Based on the prospects of a strong increase in the ocean economy (OECD, 2016), the Mauritian government aims to increase ocean based economic activity to 17% of national GDP by 2020 and raise employment to 26,000 full time equivalents (FTE) (The Ocean Economy: A Roadmap for Mauritius, 2013). Recent policy developments to meet these goals include the publication of The Ocean Economy: A Roadmap for Mauritius, 2013, the convening of a National Taskforce on Ocean Economy to oversee the implementation of this Roadmap and a new Ocean Economy ministry and national ocean council. Along with a Regulatory Framework, Business Development, International and Regional Co-operation and increased R&D in the OE, the Roadmap identified fiscal policy, investment and infrastructure as key enablers to achieve growth in the Ocean Economy (The Ocean Economy: A Roadmap for Mauritius, 2013). At the same time, to pursue the goal of a socially inclusive society, the Mauritian government has emphasized the development and economic expansion of the Ocean Economy as a means to contribute to greater equity and social justice in Mauritius.

Providing accessibility to jobs, markets, social interaction, education, and services that contribute to healthy and fulfilled lives, transportation is considered 'a key enabler for inclusive economic and social growth' in the Sustainable Development Goals (SDG) agenda (UN, 2016; Jansen et al, 2018). Maritime transport dominates international trade and access to a working port infrastructure is thus critical for any national economy and its citizens (UNCTAD 2016; Jansen et al, 2018; Anand & Grainger, 2018). Following successful port development in Singapore, Shenzhen, Hong Kong and Dubai, many countries are planning to build up regional hub ports, expecting additional growth of their economies in forms of new service markets (Munim & Schramm, 2018). Within this context, a number of studies have investigated the effect of port investment on national and regional economic growth (Dooms et al., 2011; Lee et al., 2012). The findings of these studies showed that there is a positive relationship between seaport investment and economic growth in terms of employment and value added (Dwarakish and Salim, 2015; Chang et al., 2015; Song & van Geenhuizen, 2014; Bottasso et al., 2014). Less focus has been placed on the wider socio-economic or welfare impacts of port development, specifically the redistribution of wealth between groups as a result of port development (Dooms et al., 2011; Santos et al., 2018b). At the same time, the economic development literature offers a substantial debate on the factors that affect the amount of poverty reduction and income redistribution associated with economic growth

more broadly (Anderson et al., 2018; Verschoor & Kalwij, 2006; Kraay, 2006; Kakwani, 2000). Research has indicated that economic growth does not necessarily promote (a) poverty reduction or (b) a reduction in income inequality (Anderson et al., 2018; Verschoor & Kalwij, 2006; Kraay, 2006; Kakwani, 2000). Within this context, Government investment in the Ocean Economy sector suggests a number of important questions: (1) what is the OE overall economic contribution in Mauritius? (2) What impact will future investment in the Ocean Economy have on the Mauritian economy in both the short and medium to long term? (3) What is the distributional impact of investment in an ocean economy sector, specifically the port sector across households in Mauritius again in both the short and medium to long term?

Similar to an Input-Output framework, a Social Accounting Matrix (SAM) framework may be used to simulate the direct and indirect impact of an investment across specific industrial sectors and the wider economy as a whole. In comparison to an Input-Output model, this disaggregation helps develop a crucial understanding of the socio-economic impacts across households of sector specific investments (Stuttard & Frogner, 2003). Using the Social Accounting Matrix (SAM) estimated by a joint World Bank-Mauritius Government team, this paper examines the economic impact of expanding the port in St Louis in the short (via the construction sector(and medium to long term (via the maritime transport sector) on the (i) Mauritian economy as a whole, (ii) the distribution of labour by educational classification and (iii) the distribution of income among household income categories. The next Section introduces the proposed development scenarios for Port St Louis.

2. Proposed Development Scenarios for the Port Sector

As a small island State, Mauritius is highly dependent on international trade; and shipping and port infrastructure plays a vital role in the national economy. At the same time, the intensification of the south-south maritime trade corridor (Coulibaly et al., 2006), growth in the cruise industry, the high likelihood of discovering hydrocarbon reservoirs in Mauritian waters and the potential for offshore renewable energy suggest that the port sector is a strategic Ocean Economy investment opportunity. Located at the crossroads of Asian and African sea routes, Port Louis, the main seaport of Mauritius, handles 99% of the country's external trade, and has become an important hub for the trans-shipment of containers moving between other countries (Farrell, 2017; Burthoo-Barah & Tandrayen 2014). It accounts for approximately 2% of the country's gross output, 1.6% of GDP and – directly or indirectly – at least 10,000 jobs (Farrell, 2017). Exports of goods & services account for

approximately 49% of the country's GDP, much higher than in neighbouring African countries. As such, the port sector has been identified as an important Ocean Economy sector with significant growth potential in itself, but also as crucial for the expansion of the Ocean Economy as a whole (The Ocean Economy: A Roadmap for Mauritius, 2013; Farrell, 2017).

To meet both domestic and develop international demand and facilitate the growth of the OE, the Mauritian government is planning to reposition Port Louis as a regional trade hub, with the focus on trans-shipment of petroleum products as well as containers, seafood processing, bunkering and cruise activities. The Port Master Plan completed by the Dutch engineering firm Royal Haskoning DHV in July 2016 includes two investment and development scenarios (Figure 1). A conservative scenario totaling US$1089 million in investment over 10 year including additional investments that are needed to service the growth expected in the Mauritius economy, and relatively low-cost public investments to support the government's Ocean Economy policy.

(i) A new gate complex for the MCT container terminal (US$22 million);

(ii) A second oil jetty at Fort George to support the expansion of bunkering activities and LPG trading (US$100 million);

(iii) Reconstruction of Quay 1 to improve handling speeds for Mauritius coal imports (US$36 million);

(iv) Redevelopment of Quays D-E as an additional fish landing and processing complex (US$8 million);

(v) Construction of a new cruise terminal (US$12 million);

(vi) Construction of a small breakwater at Caudan to allow the basin to be developed for marina activities (US$4 million);

(vii) Construction of a small breakwater and fishing quay at Fort William to allow (largely idle) fishing vessels to be moved from TrouFanfaron for security and urban development reasons (US$29 million);

(viii) Development of a new marina at Grand River North West (US$12 million)

An optimistic scenario totalling US$1332 million in investment over 20 years including:

(i) Construction of a large breakwater to protect the MCT container terminal from wave action caused by climate change, with a privately funded container berth on the shoreward side of the breakwater;

(ii) Development of a petroleum hub to support oil trading activities that are

"external" to the domestic economy and

(iii) Construction of a third, privately funded shipyard.

For the optimistic scenario to happen, there would have to be a strong government push to accelerate the port development program or an upturn in particular markets that causes the projects to be brought forward in time. Both scenarios assume that all of the short-term investments currently at the planning stage, totaling $520 million will go ahead. These include: (i) routine investment undertaken by MPA (port infrastructure) and CHCL (port services) in asset replacement, and small-scale improvements for performance improvement, safety and security, and administrative or social reasons ($183 million); (ii) larger investments to which MPA and CHCL are contractually committed – the most important being the expansion of the MCT container terminal (for a combined total of $306 million between 2015-20); and (iii) likely capital outlays of private port service providers – this is mainly office equipment and vehicles, but also includes the current expansion plans of the two ship repair yards ($31 million). The next Section introduces a Social Accounting Matrix (SAM) for Mauritius, which allows the distributional impact of the two investment scenarios proposed to be examined across households.

Figure 1 Proposed Port Redevelopment

3. Social Accounting Matrix

The literature on infrastructure investment suggests that development of the port in St Louis will undoubtedly promote economic growth (Gannon & Liu, 1997; Zou et al., 2008; Dercon et al., 2009; Pettit & Beresford, 2009; Jouanjean et al., 2015; Kumari & Sharma, 2017). However, it is not clear that poor households will receive income from this development. Part of this issue is that most of the literature in this area, specifically port infrastructure development has used production-based methodologies such as Input-Output Tables to examine the impact of port development on national and local economies (Dooms et al., 2011; Santos et al., 2018a). However, Input-Output tables do not allow the assessment of wider welfare measures such as the redistribution of income as a result of investment activity. A Social Accounting Matrix (SAM) is a system of national/regional/sub-regional accounts represented in a matrix format (Scandizzo & Ferrarese, 2015). A SAM consists of a set of interrelated subsystems that, on the one hand, give an analytical picture of the economy in a particular accounting period, and, on the other hand, serve as an instrument for assessing the effects of changes on the

flows represented (injections and leakages in the system). The advantage of using a SAM rather than an Input-Output model is that a SAM shows much more detail about the circular flow of income throughout the economy, including transactions between different household groups. Capturing these distributional flows, a SAM framework is able to examine the distribution of income to the different recipients, i.e., the distribution of nominal income between wages and profits and the distribution of wages and profits among households and government. It can thus be used to simulate the distributional impact of government policies and public or private investment, as recent papers on the economic impact of the marine sector have demonstrated (Arita et al., 2013; Vega et al., 2014; Waters et al., 2014; Sueng & Waters, 2014; Sueng, 2016; 2017). In turn, this disaggregation helps develop a crucial understanding of the socio-economic impacts across households of sector specific investments (Stuttard & Frogner, 2003). The economic system is typically disaggregated into the following blocks:

i. Primary production factors (Labor and Capital);
ii. Production sectors (Agriculture, Industry, Services and their disaggregation);
iii. Households;
iv. Corporations;
v. Government (Public Administration);
vi. Capital Formation (Public and Private gross fixed investments);
vii. Rest of the World (ROW).

Both the expenditures (columns) and revenues (rows) are defined for any productive and institutional sector. In a typical SAM structure, columns represent the outflows of the different economic agents that is, the expenditure of any aggregate with respect to the others, while rows represent the inflows, namely the income formation. Since total incomes equal total expenditures, including savings and capital formation, the SAM is a square and balanced matrix (Scandizzo & Ferrarese, 2015). A simplified scheme of the SAM is presented in Figure 2. If data are available, any of the above blocks can be further disaggregated depending on the objective of the analysis (Scandizzo & Ferrarese, 2015). For example, on the production side, it is also customary to differentiate between activities and commodities, which allows the establishment of a secondary flow between productive sectors and commodities and vice versa (Fernandez-Macho et al., 2008). Similarly, the SAM structure also allows the incorporation of different kinds of households (*e.g.* depending on their income level, origin, etc.), as well as other institutions such as firms (*e.g.* depending on their size), the foreign sector (*e.g.* depending on the geographical zone) and the government (Fernandez-Macho et

al., 2008). Compensation of employees (wages), a component of Value Added, can also be broken down by educational categories, for example primary education only, lower secondary education, etc.

Figure 2 Structure of the Social Accounting Matrix

To calculate the impact of an investment across the different accounts, a SAM based model requires that one or more accounts are made exogenous to allow the changes in the exogenous accounts be translated into changes in another sector's supply (Miller and Blair, 2009). This operation turns the model into a demand-driven Keynesian model with no resource constraints. The exogenous accounts are aggregated into a single account, which records the injections into the system and the leakages from it (Vega et al., 2014). The exogenous account can be seen as an independent variable while the endogenous account is the dependent variable. The choice of which transactions and transfers are to be considered endogenous and/or exogenous depends on the policy question. Once the SAM has been partitioned into endogenous and exogenous accounts, it can be used to model the impact of exogenous shocks on specific sectors of the economy (Miller and Blair, 2009). Given its ability to coherently represent all the relations characterizing an economic system and the national account structure, the SAM is both a powerful descriptive tool and a valid starting point for economic modelling (Scandizzo & Ferrarese, 2015).

The structure of the 2015 Ocean Economy SAM model for Mauritius

The SAM structure presented in this paper was estimated taking the 2007 National SAM estimated by Statistics Mauritius (under the aegis of the Ministry of Finance & Economic Development) and updating to 2015 values and applying a maximum entropy algorithm according to the methodology outlined in Scandizzo and Ferrarese (2015). The SAM for the Mauritian economy consists of an 85 x 85 matrix with 30 activities, 30 good and services, 7 factor income, 6 institutions, capital formation, a rest of the world (ROW) sector and 7 environmental sectors. Previous research on the OE has noted the difficulty in obtaining estimates of the value of the sector due to the wide sectoral scope of the OE and data limitations that accompanies such a broad sector (Kildow & McIlgorm, 2010; Colgan, 2013). However, much work has been done on deciding a definition of the OE over the last decade (Park & Kildow, 2014) with most studies adopting an approach whereby a sector is considered part of the OE if they directly or indirectly use the marine resource within their process of

production. Using this definition and data from the Census of Economic Activities, the Annual Survey of large establishments and administrative data for government, the Mauritius Office of Statistics identified the following products and services as belonging to the Mauritian OE:

- Fish and other fishing products
- Aquaculture
- Seaweed culture
- Seafood processing
- Shipbuilding and repairs
- Bunkering and energy trading
- Freeport zone
- Sea transport
- Deep water application
- Marine and port finance
- Marine insurance
- Seabed exploitation of hydrocarbon and minerals
- Ocean renewable energy
- Coastal Hotel and Restaurant
- Yacht services marine leisure-big game fishing
- Telemarketing services for cruise lines
- Water bottling
- Marine pharmaceuticals
- Vocational and tertiary education in maritime/ocean
- Application of big data and maritime digitization

For the purpose of the SAM, these sectors were aggregated into five broad OE sectors namely the fish and other fishing products including aquaculture, fish processing, maritime transportation, services allied to transport, coastal hotel and restaurant activities and recreation & sporting marine activities sector.

To trace out and analyse the linkages within the Mauritian economy, the model assumes that all equations are linear, prices are fixed, and all production activities function under the condition of excess demand. The simplest SAM-based model assumes that one or more accounts are made exogenous to allow the changes in the exogenous accounts to be translated into changes in another sector's supply. The choice of which transactions and

transfers are to be considered endogenous and/or exogenous depends on the policy question (Vega et al., 2014). For the purpose of this model, the investment and rest of the world accounts are aggregated into a single exogenous account and the remaining accounts are viewed as endogenous. The partitioning of the SAM into endogenous and exogenous accounts allows for different scenarios to be examined. Following Miller and Blair 2009], the matrix of direct coefficients in a demand-driven SAM is given by

$$S = \begin{bmatrix} A & O & C \\ V & O & O \\ O & Y & H \end{bmatrix} \text{ (Eq. 1)}$$

Where A is the matrix of intra-industries technical coefficients, sales and purchases; V is the matrix of value added coefficients, payments from production accounts to factors; Y is the matrix of value added distribution coefficients, factor payments to other institutions; C is the matrix of expenditure coefficients, household purchases of industry output; and H is the matrix of institutional and household distributional coefficients, inter-household and/institution transfers. The demand system of equations is given by:

$$\begin{bmatrix} x \\ v \\ y \end{bmatrix} = S \begin{bmatrix} x \\ v \\ y \end{bmatrix} + \begin{bmatrix} e_x \\ e_y \end{bmatrix} \text{ (Eq. 2)}$$

Where x, v and y are the vectors of total production, total value added and total institutional income, respectively; e_x and e_y are the vectors of exogenous good and services demand and household transfer payments. The demand-driven multipliers are obtained using the following equation:

$$\begin{bmatrix} x \\ v \\ y \end{bmatrix} = (I - S)^{-1} \begin{bmatrix} e_x \\ e_y \end{bmatrix} \text{ (Eq. 3)}$$

This system of equations can be used to calculate the impact, from an exogenous increase in demand (Vega et al., 2014), with demand multipliers ensuing from the purchases directly and indirectly generated by the expansion of production and consumption activities from land, capital, and labour inputs (factor inputs) as well as the intermediate inputs from the commodity markets (Vega et al., 2014; Sueng & Waters, 2013; Croes & Rivera, 2017).

Distributional aspects of a SAM

Fiscal policy, via public investment can affect the real income position of households by altering the use and remuneration of production factors and thus have an impact on factor incomes that varies with factor endowments (Thiele & Piazolo, 2002). Government policy in the OE is targeting the port sector via two investment scenarios: a conservative scenario and an optimistic scenario totalling US$1332 million in investment. To understand the economic and wider redistributive impact of the investment requires modelling two distinct project effects. In the short term, the first set of effects will occur during the project construction period and is the consequence of increased demand for capital goods utilized to build the physical facilities of the project. Within a SAM framework, these effects can be simulated by a shock to the sectors providing these capital goods, which are typically construction and machinery. The second set of effects will occur once the port is operational as a result of the increased production capacity due to port expansion. Within the SAM, assuming that the export of port services is constrained by the existing port capacity, the ensuring potential increase in supply can be simulated as being equivalent to an increase in demand for port services by the rest of the world, which can then be represented as a shock to the maritime transport sector. The two effects are not directly comparable, since the impact of the shock during the construction period will only be limited to the building phase of the project, while the impact of port services increases will continue every year in which the project will be operational. In both cases, it is assumed that the project is sufficiently small that the resources it requires can be considered completely additional. Thus, its implementation will not "crowd out" other projects and its full effect will not depend on what would happen in the absence of the project (the "counterfactual"), that is on the alternative projects that could be enacted with the same resources.

To obtain information on the impact of both short and medium to long term investment on income distribution, the SAM disaggregates value added into labour (Compensation of Employees) and capital income, which in turn can be further extended by distinguishing across different categories of each. For the Mauritian SAM, compensation of employees has been split into four groups based on employee education level, including primary education only, lower secondary education, higher secondary education and university level education. However, knowledge of the functional income distribution constitutes only a first step towards assessing the distributional impact of an investment or fiscal stimulus. More direct insights can be gained by tracing the flow of income from factors to households (Thiele &

Piazolo, 2002). The household sector in the Mauritian SAM is split into four groups, poor, lower middle, higher middle and wealthy households using the monthly household income per adult equivalent on the from the Mauritian Household Budget Survey (2014). These four income groups were chosen, as they are consistent with the Mauritian National Accounts used in the 2007 SAM. The data on household income is taken from the Household Budget Survey and is based on equalized income, which is ranked and divided into Deciles. The four categories of household are as follow:

- Poor households, income decile 1-2: 7.7% of all households,
- Lower middle-income group, income decile 3-5: 42.3% of households,
- Upper middle-income group income decile 6-9: 40.0% of households
- Wealthy households, income decile 10: 10% of households

The next Section presents the results of the impact of public investment in the port sector on the economy as a whole and across different households.

4. Results

Responding to the Governments need for an economic indicator to capture both the GDP contribution and distributional impact of ocean economic activities, Statistics Mauritius was tasked with developing an ocean economy indicator demonstrating the turnover and percentage contribution of the Ocean Economy in Mauritius (The Ocean Economy: A Roadmap for Mauritius, 2013). Table 1 presents the economic contribution of the sectors identified as being part of the Ocean Economy by GDP for 2012, 2013 and 2014, for which data is was available. The table indicates that the ocean economy's share of GDP contributed on average 10.4% of GDP between 2012 and 2014, of which over 90% currently comes from three established sectors – coastal tourism and marine leisure, seaport-related activities and seafood-related activities. However, whilst Table 1 provides important headline figures on the economic impact of the ocean economy at the national level, the methodology behind Table 1 only examines the impact of the sector at the national level and is unable to estimate the contribution of the sector at the household level. Responding to the Mauritian's government need to understand the distributional impact of future investment in the Ocean Economy, the SAM model for Mauritius outlined in Section 3 can be used to calculate the impact of investment not just on output, but also across different categories of employees and households as well as examining the short and medium to long term impacts of the investment.

Table 1. The Ocean Economy contribution to GDP in Mauritius (Million US$), 2012-2014 (Source: Mauritius Statistics)

				Contribution to GDP (%)		
	2012	**2013**	**2014**	**2012**	**2013**	**2014**
GDP at basic prices (Million US$)	**8.79**	**9.37**	**9.92**			
Ocean Economy Activities						
Aquaculture	0.81	0.87	1.07	0.01	0.01	0.01
Fishing	8.15	11.55	21.88	0.09	0.12	0.22
Fish processing	0.12	0.12	0.12	1.32	1.36	1.14
Ship building & maintenance	8.47	12.56	13.67	0.10	0.13	0.14
Storage	19.99	20.25	21.85	0.23	0.22	0.22
Sea transport	4.09	4.41	3.83	0.05	0.05	0.04
Services allied to transport	0.15	0.15	0.15	1.58	1.55	1.60
Ship store and bunkering	26.70	24.43	20.80	0.30	0.26	0.21
Freeport activities	0.06	0.06	0.06	0.53	0.54	0.55
Hotels and restaurants	0.46	0.44	0.46	5.35	4.57	4.72
Leisure boat activities	0.09	0.12	0.12	1.43	1.18	1.22
Total	69.08	74.95	84.03	10.99	9.99	10.07

To begin the analysis, baseline values of total value added, household income (poor, lower middle, higher middle, wealthy), corporations and government revenue for the Mauritian economy are presented in Table 2. Total value added for the Mauritian economy in 2012 was $357 million. More importantly Table 2 indicates that 42% of all compensation to employees

go to individuals with university level education. This indicates the large returns from a university education in the Mauritian economy with primary education only, lower secondary education and upper secondary education receiving 20%, 18% and 20% of the compensation, respectively. With regard to the distribution of income across households, Table 2 indicates that poor households, representing 7.7% of the population (Mauritius Statistics, 2013) received just $6 million, 1.4% of total income. Lower middle-income households, on the other hand, which are the largest part of the bottom 40% of income distribution, received 23% of total income, while higher middle income and wealthy households received 42% and 33% respectively. This indicates the considerable inequality that exists across Mauritian households.

Table 2: Mauritian Economy: Baseline values for total value added, household income (poor, lower middle, higher middle, wealthy), corporations and government revenue (Million US$)

Value Added US$M		%
Employee Compensation: Primary Education	30	20%
Employee Compensation: Secondary Education	27	18%
Employee Compensation: Secondary Education	30	20%
Employee Compensation: Tertiary Education	62	42%
Total Compensation of Employees	**149**	
Own Account	59	
Employer	15	
Operating surplus	136	
Total Value Added	**357**	
Institutions US$M		
Poor	6	1%
Lower middle	99	23%
Higher middle	179	42%
Wealthy	141	33%
Total Households	**425**	
Government	35	
Corporations	148	
Total Institutions	608	

As noted in the Introduction, the impact of port redevelopment will have both short and medium to long term impacts on the Mauritian economy. Table 3 presents the impact of the two proposed port investment scenarios in terms of changes in output in the short run via shock to the construction sector, which is chosen because, as described above, almost all the investment in the port development will be spent in the construction sector in the building phase of the project. The ensuing multipliers appear to be large (4 to 5 times the shock), even though the value-added multipliers are much lower and in reverse order (respectively 1.8 and 1.6) and suggest that the construction sector is powerfully connected with the rest of the economy. At the same time, we should consider that these estimates are only upper bounds as production effects double count the effects on intermediate goods, and in real life they could be tempered by existing bottlenecks in the economy and general equilibrium effects (Cervigni and Scandizzo, 2017). In the case of Scenario 1 a $1,089 million investment in the port sector is estimated to lead to a US$4,501 million increase in output. In the case of Scenario 2, the SAM estimates that a US$1,332 million investment in the port sector will lead to a $5,506 million increase in output. Table 3 breaks these overall figures down and presents the sectoral output multipliers for each of the 30 sectors broken into activity and services categories as calculated by the SAM. Multiplier estimates give important insights into the structure of the economy and the 'embeddedness' of different sectors in the overall economy (Vega et al., 2014). For the purpose of this paper they are also useful in helping to trace the total impacts of changes in the structure of the economy under different economic scenarios. It is important to note that the multiplier for both Scenarios is the same as the exogenous shock is on the demand of output from the construction sector. According to the SAM every time $1 is spent in the construction sector, US$0.012 goes to the agricultural sector. Thus, an investment 'shock' of US$1,889 would create US$13 million additional output in the agricultural sector.

Examining Table 3, all output sectors show a positive increase, particularly Wholesale and Retail Trade Services, and Financial intermediation, Insurance and Auxiliary services in response to the investment stimulus. However, it is important to note that this magnitude is exaggerated by double counting, since sector output includes the impact of intermediate inputs (the correspondent impact on value added is less than a half the increase in production, as shown in Table 4) and by the assumption that there is no crowding out of economic activity, for instance, through higher wages and prices. As such, this value is large and has to be interpreted as an upper bound, since in practice the expansion of demand will be met by

increases in prices and factor shortages that will reduce the full impact on the economy. While the pattern of sectorial change is identical between both scenarios, there is a marked increase in the scale of the expansionary effect.

Table 3: Short Run Impact of Scenario 1 & Scenario 2 across 30 activities and 30 goods and services (Million US$) due to a shock to the Construction Sector

		Multiplier	Scenario 1	Scenario 2
Activities	Products of agriculture, horticulture and market gardening, forestry and logging products	0.012	13	16
Activities	Sugar Cane	0.001	1	1
Activities	Live animals and animal products	0.008	8	10
Activities	Fish and other fishing products	0.001	2	2
Activities	Ores and Minerals	0.000	0	0
Activities	Meat, fruit, vegetables, oils and fats, grain mill products, starches and starch products and beverages	0.037	40	49
Activities	Fish processing	0.017	18	23
Activities	Sugar	0.001	1	1
Activities	Yarn and thread; woven and tufted textile fabrics	0.001	1	2
Activities	Knitted or crocheted fabrics; wearing apparel	0.010	11	14
Activities	Other manufactured goods	0.136	148	181
Activities	Constructions and construction services	1.008	1098	1343
Activities	Wholesale and retail trade services	0.195	213	260
Activities	Lodging; food and beverage serving services	0.019	20	25
Activities	Coastal Hotel and Restaurant	0.038	42	51
Activities	Land, air, supporting and auxiliary transport services	0.037	40	49
Activities	Sea transport and Services allied to transport	0.032	35	43
Activities	Electricity distribution services; gas and water distribution services through mains	0.021	23	28
Activities	Financial intermediation, insurance and auxiliary services	0.191	208	254
Activities	Real estate services	0.105	115	140
Activities	Telecommunications services; information retrieval and supply services	0.073	79	97
Activities	Other business services	0.028	31	38

Activities	Public administration & other services to the community; compulsory social security services	0.107	116	142
Activities	Education services	0.081	89	108
Activities	Health and social services	0.068	74	91
Activities	Sewage and refuse disposal, sanitation and other environmental protection services	0.011	13	15
Activities	Services of membership organizations	0.004	5	6
Activities	Recreational, cultural and sporting services	0.027	29	36
Activities	Recreational, sporting marine activities	0.030	33	40
Activities	Other services	0.027	30	36
Services	Products of agriculture, horticulture and market gardening, forestry and logging products	0.020	22	27
Services	Sugar Cane	0.001	1	1
Services	Live animals and animal products	0.016	17	21
Services	Fish and other fishing products	0.003	3	3
Services	Ores and Minerals	0.001	1	1
Services	Meat, fruit, vegetables, oils and fats, grain mill products, starches and starch products and beverages	0.067	73	89
Services	Fish processing	0.045	49	60
Services	Sugar	0.001	1	2
Services	Yarn and thread; woven and tufted textile fabrics	0.003	3	4
Services	Knitted or crocheted fabrics; wearing apparel	0.021	23	28
Services	Other manufactured goods	0.282	307	375
Services	Constructions and construction services	0.009	10	12
Services	Wholesale and retail trade services	0.262	285	349
Services	Lodging; food and beverage serving services	0.024	26	32
Services	Coastal Hotel and Restaurant	0.049	53	65
Services	Land, air, supporting and auxiliary transport services	0.040	43	53
Services	Sea transport and Services allied to transport	0.035	38	46
Services	Electricity distribution services; gas and water distribution services through mains	0.036	39	48
Services	Financial intermediation, insurance and auxiliary services	0.215	234	287

Services	Real estate services	0.150	163	200
Services	Telecommunications services; information retrieval and supply services	0.083	91	111
Services	Other business services	0.038	41	50
Services	Public administration and other services to the community as a whole; compulsory social security services	0.108	117	144
Services	Education services	0.088	96	117
Services	Health and social services	0.069	76	92
Services	Sewage and refuse disposal, sanitation and other environmental protection services	0.015	17	20
Services	Services of membership organizations	0.006	6	8
Services	Recreational, cultural and sporting services	0.040	43	53
Services	Recreational, sporting marine activities	0.042	46	57
Services	Other services	0.038	41	51

Table 4: Short Run Change in Production Value, Value Added & Institutions under Scenario 1 & Scenario 2 via a shock to the construction sector (Million US$)

	Scenario 1	Scenario 2	Change
Primary Education	237	290	30%
Lower Secondary Education	161	197	20%
Higher Secondary Education	135	165	17%
Tertiary Education	257	315	33%
Total Compensation	**790**	**966**	
Own Account	290	355	
Employer	61	75	
Operating surplus	653	798	
Total Value Added	**1795**	**2195**	
Poor households	29	35	2%
Lower middle households	426	521	25%
Higher middle households	688	841	41%
Wealthy households	552	675	33%
Total Households	**1694**	**2072**	

Government and NPISH	198	215	
Corporations	766	780	
Total Institutions	**2482**	**3036**	

Table 4 presents the short run impact of the Conservative and Optimistic scenarios in terms of changes in total value added (employee compensation, own account, employer and operating surplus) and total Institutions (household income; government revenue and corporate revenue (total institutions) via a shock to the construction sector. The impact of the port investment would increase total value added from US$357 million to US$1,794 million for Scenario 1 and to US$2,195 million for Scenario 2. Examining the distributional impact on wages across different educational groupings, Table 4 indicates that employees with primary education only would receive the second highest percentage of wages, and their overall percentage share of wages compared to the baseline (Table 2) would increase from 20% of total wages to 30%. In contrast, employees with lower secondary education and university education would receive a lower percentage of overall wages decreasing by 2% and 9% respectively. For households, the share of household income would increase from 1% to 2% for poor households (2% of overall household income) and from 23% to 25% for lower income households. Higher income (42% to 41%) households would see a small decrease in their relative share, while the proportion of income going to wealthy households would remain at 33%.

Table 5 continues the analysis by examining the impact of the two proposed port investment scenarios in the medium to longer run. As noted in the Introduction medium to longer run impacts are believed to originate from the maritime transport and port sector. As such, to examine the longer run impacts of government investment in the port sector a shock to the maritime sea sector is implemented. Scenario 1 would lead to a yearly increase of $4,515 million in production, while Scenario 2 would lead to a $5,517 million increase in output. Note that unlike the former scenarios of the building phase of the project, we are now estimating a yearly increase that would last, without considering maintenance costs or alternative counterfactual scenarios, for all the operational life of the project. Table 5 breaks these overall figures down and presents the sectorial multipliers for each of the 30 sectors broken into activity and services categories as calculated by the SAM. The sector most highly impacted would be the maritime transport sector itself, however as with the construction sector shock,

sectors that provide what may be described as intermediate input purchases, such as business services and wholesale and retail also receive large gains.

Table 5: Medium to Long Run Impact of Scenario 1 & Scenario 2 across 30 activities and 30 goods and services via a shock to the maritime Transport Sector

		Multiplier	Scenario 1	Scenario 2
Activities	Products of agriculture, horticulture and market gardening, forestry and logging products	0.012	13	16
Activities	Sugar Cane	0.000	1	1
Activities	Live animals and animal products	0.008	9	11
Activities	Fish and other fishing products	0.002	2	2
Activities	Ores and Minerals	0.000	0	0
Activities	Meat, fruit, vegetables, oils and fats, grain mill products, starches and starch products and beverages	0.040	43	53
Activities	Fish processing	0.018	20	24
Activities	Sugar	0.001	1	1
Activities	Yarn and thread; woven and tufted textile fabrics	0.001	2	2
Activities	Knitted or crocheted fabrics; wearing apparel	0.011	12	15
Activities	Other manufactured goods	0.042	46	56
Activities	Constructions and construction services	0.010	11	13
Activities	Wholesale and retail trade services	0.130	141	173
Activities	Lodging; food and beverage serving services	0.025	27	33
Activities	Coastal Hotel and Restaurant	0.051	55	68
Activities	Land, air, supporting and auxiliary transport services	0.070	76	93
Activities	Sea transport and Services allied to transport	1.057	1,151	1,408
Activities	Electricity distribution services; gas and water distribution services through mains	0.021	23	28
Activities	Financial intermediation, insurance and auxiliary services	0.202	220	269
Activities	Real estate services	0.117	127	155
Activities	Telecommunications services; information retrieval and supply services	0.089	97	119
Activities	Other business services	0.062	68	83

Activities	Public administration and other services to the community as a whole; compulsory social security services	0.113	123	150
Activities	Education services	0.092	100	122
Activities	Health and social services	0.074	81	99
Activities	Sewage and refuse disposal, sanitation and other environmental protection services	0.013	14	17
Activities	Services of membership organizations	0.005	5	6
Activities	Recreational, cultural and sporting services	0.031	33	41
Activities	Recreational, sporting marine activities	0.034	37	46
Activities	Other services	0.028	31	37
Services	Products of agriculture, horticulture and market gardening, forestry and logging products	0.021	23	28
Services	Sugar Cane	0.000	1	1
Services	Live animals and animal products	0.017	18	22
Services	Fish and other fishing products	0.003	3	4
Services	Ores and Minerals	0.000	0	0
Services	Meat, fruit, vegetables, oils and fats, grain mill products, starches and starch products and beverages	0.071	78	95
Services	Fish processing	0.048	52	64
Services	Sugar	0.001	1	1
Services	Yarn and thread; woven and tufted textile fabrics	0.003	3	4
Services	Knitted or crocheted fabrics; wearing apparel	0.023	25	30
Services	Other manufactured goods	0.087	95	116
Services	Constructions and construction services	0.010	11	14
Services	Wholesale and retail trade services	0.203	221	270
Services	Lodging; food and beverage serving services	0.032	35	42
Services	Coastal Hotel and Restaurant	0.065	70	86
Services	Land, air, supporting and auxiliary transport services	0.077	84	103
Services	Sea transport and Services allied to transport	0.063	69	84
Services	Electricity distribution services; gas and water distribution services through mains	0.035	38	46
Services	Financial intermediation, insurance and auxiliary services	0.228	248	303
Services	Real estate services	0.168	183	223

Services	Telecommunications services; information retrieval and supply services	0.102	111	136
Services	Other business services	0.083	90	110
Services	Public administration and other services to the community as a whole; compulsory social security services	0.114	125	152
Services	Education services	0.099	108	132
Services	Health and social services	0.076	83	101
Services	Sewage and refuse disposal, sanitation and other environmental protection services	0.017	18	22
Services	Services of membership organizations	0.006	7	8
Services	Recreational, cultural and sporting services	0.045	49	60
Services	Recreational, sporting marine activities	0.048	52	64
Services	Other services	0.041	45	55

Table 6: Medium to Long Run Change in Production Value, Value Added & Institutions under Scenario 1 & Scenario 2 due to a shock to the Maritime Sector

	Scenario 1	Scenario 2	% Return
Primary Education	139	170	17%
Lower Secondary Education	157	192	19%
Higher Secondary Education	167	204	20%
Tertiary Education	362	443	44%
Total Compensation	**825**	**1009**	
Own Account	261	320	
Employer	60	74	
Operating surplus	665	813	
Total Value Added	**1812**	**2217**	
Poor households	24	29	1%
Lower middle households	412	504	22%
Higher middle households	741	907	40%
Wealthy households	657	804	36%
Total Households	**1834**	**2244**	
Government and NPISH	175	215	
Corporations	638	780	

Total Institutions	2648	3238	
Total Output	4513	5520	

In the medium to long run, the impact of the port investment via a shock to the maritime transport sector would increase total yearly value added from $357 million to $1,812 million for Scenario 1 and to $2,217 million for Scenario 2. Examining impact on wages across different educational groupings, Table 6 indicates that employees with primary education only would receive the lowest percentage of wages, and their overall percentage share of wages compared to the baseline (Table 2) would decrease from 20% of total wages to 17%. In contrast, employees with lower secondary education and university education would receive a slightly higher percentage of overall wages increasing by 1% and 2% respectively. Examining the impact on households, one can see that the share of household income would remain the same for poor households (1% of overall household income), whilst wealthy households would see a 3% increase in their relative share of overall income (33% to 36%). Lower income (23% to 22%) and higher income (42% to 40%) would see a small decrease in their relative share.

While the results of the medium to long term impact of the redevelopment of Port St Louis indicate that investment would maintain current levels of inequality in Mauritius, it is important to note the following two facts. First, the structure of the SAM model means that the distributional effects of any income increase tend to be the consequence of backward and forward linkages as two concurring, but possibly contrasting factors. The backward linkages of the various income groups will tend to privilege the groups that are more strongly connected as suppliers of factors of production (the various types of capital and labor) to the sectors activated by the shock. Groups with higher forward linkages , on the other hand , will be mostly benefitted by the demand increase because they will participate to the economy's expansion through their larger share of consumption in each sector. Second, a likely decrease in the number of poor households can also be predicted, since the decrease of the number of the poorest depends on the difference between the increase in total income and on the average income of poor households.

5. Discussion

Expansionary fiscal policy through public investment, such as the port investment being considered by the Mauritian government, is considered a primary tool for governments to

affect income distribution (Fauzel et al., 2016). A key condition of the Mauritian government is that future ocean related development should contribute to greater equity and social justice in Mauritius. While previous research has found a positive economic impact from port development, most of these studies have focused on economic indicators such as changes in GDP, GVA and employment (Dwarakish and Salim, 2015; Chang et al., 2015; Song & van Geenhuizen, 2014; Bottasso et al., 2014). In contrast, not much research has examined the distributional impact of port development across different households or employees. Within this context, this paper used a SAM as a means of understanding the distributional impact of port investment across different household groups both in the short (via a shock to the construction sector) and medium to long term via a shock to the maritime transport sector).

Focusing on the distributional impact of port development in the short run via an increase in output in the construction sector, this analysis found that investment in the port sector would mostly benefit poorer households. This would occur because the building phase of the project would see a large increase in the proportion of compensation of employees going to primary school educated only employees (10%) and some increase in the share of the income accruing to poor (1%) and lower income (2%) households. Higher income and wealthy households would not benefit from port investment activity in the short term. Examining the medium to longer term impacts through a shock to the maritime transport sector, and more significantly given the persistence of the effects simulated for the entire project life, this analysis found that investment in the port sector would do little to redistribute wages and income between employees or household. Indeed, increases would be experienced by university educated employees and upper income households. In the long run, port investment would maintain current levels of inequality in Mauritius. These results suggest that if port redevelopment is to go ahead, the government may need to consider complementary pro-poor redistributive policies in the medium to longer term.

It is also important to be reminded of some structural restrictions of this methodology. For example, a SAM only considers functions of production of constant returns of scale and has no supply constraints, price changes do not result in the purchase of substitute goods, and sector output proportions remain the same regardless of the total output (Jones, 2010; Croes & Rivera, 2017). In contrast, computable general equilibrium (CGE) models capture the inter-relationships among sectors of an economy, including household, industry, government, and external sectors. It also incorporates market mechanisms and price incentives within a general

equilibrium framework. CGE models have been utilized in general economic impact assessments as well as port efficiency studies (Tiwari & Itoh, 2001; Haddad et al., 2010, Cervigni and Scandizzo, 2017). However, CGE models are computationally more complex and less transparent and detailed, results using a SAM can be interpreted as a special case of a CGE model where the project is sufficiently small with respect to the economy as a whole that it produces no general equilibrium effects on process or incomes. Furthermore, although SAM overestimate the positive effects in the short run, they provide insightful and meaningful information in the medium run when labour and capacity constraints are adjusted (Croes & Rivera, 2017). In the case of a developing country, such as Mauritius, with high unemployment, underemployment, and excess capacity, SAM is more reliable, because of the presence of a condition to increase output without affecting prices. Limitations aside, this study presents a contribution to the broad area of strategic planning for the ocean economy in Mauritius. Policy makers need to know the economic impact of investment not just in the targeted sector but also across the economy as a whole.

References

Arita S, Pan M, Leung P. The distributive economic impacts of Hawaii's commercial fishery: a SAM analysis. Fish Res 2013.

Bottasso A, Conti M, Ferrari C, Tei A. Ports and regional development: a spatial analysis on a panel of European regions. Transportation Research Part A: Policy and Practice. 2014; 65:44-55.

Burthoo-Barah S.B., Tandrayen V (2014). Maritime Security and Piracy in Mauritius In Bichou, K., Szyliowicz, J.S. and Zamparini, L. eds., 2014. *Maritime Transport Security: Issues, Challenges and National Policies*. Edward Elgar Publishing.

Cervigni, R. and Scandizzo P.L. (eds), 2017 *The Ocean Economy in Mauritius: Making It Happen, Making It Last*, the World Bank, Washington DC.

Clark, X., D. Dollar and Micco, A. 2004. Port Efficiency, Maritime Transport Costs and Bilateral Trade, Working Paper 10353, NBER, Cambridge.

Chang Y-T, Shin S-H, Lee PT-W. Economic impact of port sectors on South African economy: An input–output analysis. Transport Policy. 2014; 35:333-340.

Colgan, C.S., 2013. The ocean economy of the United States: Measurement, distribution, & trends. Ocean Coast. Manag. 71, 334–343.

Coulibaly, S. and Fontagné, L. South-South Trade: Geography Matters. *Journal of African Economies*. 2006 15(2): 313-341.

Croes R, Rivera MA. Tourism's potential to benefit the poor: A social accounting matrix model applied to Ecuador. *Tourism Economics*. 2017 23(1):29-48

Dercon, S., Gilligan, D.O., Hoddinott, J. and Woldehanna, T. (2009) 'The Impact of Agricultural Extension and Roads on Poverty and Consumption Growth in Fifteen Ethiopian Villages'. American Journal of Agricultural Economics 91(4): 1007-1021.

Dooms M, Elvira Haezendonck & Alain Verbeke (2015) Towards a meta-analysis and toolkit for port-related socio-economic impacts: a review of socio-economic impact studies conducted for seaports, Maritime Policy & Management, 42:5, 459-480.

Dwarakish GS, Salim AM. Review on the role of ports in the development of a nation. Aquatic Procedia. 2015 4:295-301.

European Commission. Blue growth: opportunities for marine and maritime sustainable growth COM, 2012

Fauzel, S., Seetanah, B. and Sannassee, R.V. (2016) A Dynamic Investigation of Foreign Direct In- vestment and Poverty Reduction in Mauritius. *Theoretical Economics Letters*, **6**, 289-303.

Fernández-Macho, J., Gallastegui, C., & González, P. (2008). Economic impacts of TAC regulation: A supply-driven SAM approach. *Fisheries Research*, *90*(1), 225-234.

Gannon, C. and Liu, Z. (1997) Poverty and transport. Washington, DC: World Bank.

García-de-la-Fuente, Laura, Esteban Fernández-Vázquez, and Carmen Ramos-Carvajal. A methodology for analyzing the impact of the artisanal fishing fleets on regional economies: An application for the case of Asturias (Spain). *Marine Policy* 74 (2016): 165-176.

Grealis E, Hynes S, O'Donoghue C, Vega A, Van Osch S, Twomey C. The economic impact of aquaculture expansion: An input-output approach. *Marine Policy*, 2017, 81, 29-36.

Jansen M, van Tulder R, Afrianto R. Exploring the conditions for inclusive port development: the case of Indonesia. Maritime Policy & Management. 2018 May 27:1-20.

Jones S. The economic contribution of tourism in Mozambique: Insights from a Social Accounting Matrix, *Development Southern Africa*, 2010, 27:5, 679-696.

Jouanjean M, Gachassin M, te Velde D. Regional infrastructure for trade facilitation–impact on growth and poverty reduction. *Literature Review. London: ODI*, 2015.

Haddad, E. A., Hewings, G. J., Perobelli, F. S., & Santos, R. C. (2010). Regional effects of port infrastructure: a spatial CGE application to Brazil. *International Regional Science Review*.

Kakwani, N. What is pro-poor growth? *Asian Development Review* 2000, 18 (1), 1–16.

Kraay, A. When is growth pro-poor? Evidence from a panel of countries. *Journal of Development Economics*, 2006, 80, 198–227

Kwak, S.J. S.H. Yoo, J.I. Chang, The role of the maritime industry in the Korean national economy: an input–output analysis, *Marine Policy*, 2005, 29, 371–383.

Lee TC, Lee PT, Chen T. Economic impact analysis of port development on the South African economy. South African Journal of Economics. 2012 Jun;80(2):228-45.

Mauritius Statistics, *Poverty Analysis Report 2012*, Ministry of Finance and Economic Development, http://statsmauritius.govmu.org/English/StatsbySubj/Documents/Poverty/Poverty%20Analysis%202012.pdf

Midmore P, Munday M, Roberts A. Assessing industry linkages using regional input-output tables. Regional Studies 2006; 40(3); 329- 343.

Miller RE, Blair PD (2009) Input-output analysis: foundations and extensions, 2nd edn. Cambridge University Press, Cambridge

Morrissey, K., O'Donoghue, C. and Hynes, S. Quantifying the value of multi-sectoral marine commercial activity in Ireland. *Marine Policy*, 2011, 35(5), 721-727.

Morrissey K, O'Donoghue C. The Irish marine economy and regional development. *Marine Policy*, 2012, 36(2), 358-364.

Morrissey, K, O'Donoghue, C. The Role of the Marine Sector in the Irish National Economy: An Input-Output Analysis. *Marine Policy*, 2013, 37. 230-238.

Anand H, Grainger A. The port as a critical piece of national infrastructure, Safety and Reliability, (2018). DOI: 10.1080/09617353.2017.1334292

OECD. *The Ocean Economy in 2030*, 2016, OECD Publishing, Paris.

Pettit S, Beresford A. Port development: from gateways to logistics hubs, *Maritime Policy & Management*, 2009 36:3, 253-267.

Santos AM, Salvador R, Dias JC, Soares CG. Assessment of port economic impacts on regional economy with a case study on the Port of Lisbon. *Maritime Policy & Management*. 2018a, 18:1-5.

Santos, A. M. P., R. Salvador, and C. Guedes Soares. A Dynamic View of the Socioeconomic Significance of Ports. *Maritime Economics and Logistics* 2018b. 20: 169–189.

Scandizzo PL, Ferrarese C. Social accounting matrix: A new estimation methodology. *Journal of Policy Modeling*. 2015 28; 37(1): 14-34.

Seung CK, Waters EC. Calculating impacts of exogenous output changes: application of a social accounting matrix (SAM) model to Alaska fisheries. *The Annals of Regional Science*, 2013, 51(2), pp.553-573.

Seung CK. A Multi-regional Economic Impact Analysis of Alaska Salmon Fishery Failures. *Ecological Economics*, 2017,138, 22-30.

Sharpley R & Perunjodi Naidoo (2010) Tourism and Poverty Reduction: The Case of Mauritius, *Tourism and Hospitality Planning & Development*, 7:2, 145-162.

Song L, van Geenhuizen M. Port infrastructure investment and regional economic growth in China: Panel evidence in port regions and provinces. *Transport Policy*. 2014; 36:173-183.

Surís-Regueiro, J. C., Garza-Gil, M. D., & Varela-Lafuente, M. M. (2014). Socio-economic quantification of fishing in a European urban area: The case of Vigo. *Marine Policy*, *43*, 347-358.

Stuttard N, Frogner M. Developing a pilot social accounting matrix for the United Kingdom. Economic Trends. 2003;594:80-93.

Svirydzenka, K. and Petri, M.M., 2017. *Mauritius The Drivers of Growth—Can the Past be Extended?* (No. 14-134). International Monetary Fund.

Thiele, Rainer; Piazolo, Daniel.Constructing a social accounting matrix with a distributional focus: the case of Bolivia, 2002, Kiel Working Paper, No. 1094.

Tiwari, P., & Itoh, H. (2001). A computable general equilibrium analysis of efficiency improvements at Japanese ports. *Review of Urban & Regional Development Studies*, *13*(3), 187-206.

United Nations. 2016. Mobilizing Sustainable Transport for Development: Analysis and Policy Recommendations from the United Nations Secretary-General's High-Level Advisory Group on Sustainable Transport, 67. New York: United Nations Division for Sustainable Development.

Vega A, Miller AC, O'Donoghue C. Economic impacts of seafood production growth targets in Ireland. Marine Policy. 2014 1;47:39-45.

Verschoor, A., & Kalwij, A. Aid, social policies and pro-poor growth. *Journal of International Development*, 2016, 18, 519–532.

Waters EC, Seung CK, Hartley ML, Dalton MG. Measuring the multiregional economic contribution of an Alaska fishing fleet with linkages to international markets. *Marine Policy*. 2014 31; 50:238-48.

World Bank and United Nations Department of Economic and Social Affairs. 2017. The Potential of the Blue Economy: Increasing Long-term Benefits of the Sustainable Use of Marine Resources for Small Island Developing States and Coastal Least Developed Countries. World Bank, Washington DC.

Zou, W. Zhang, F Zhuang, Z, Song H. 2008. Transport Infrastructure, Growth and Poverty Alleviation: Empirical Analysis of China. Annals of Economics and Finance 9(2), 345-371.

	Activities C1	Commodities C2	Factors C3	Households C4	Government C5	Savings and Investment C6	Rest of the World	Total
						Expenditure Columns		
Activities **R1**		Domestic Supply						Activity Income
Commodities **R2**	Intermediate Demands			Consumption Spending **(C)**	Recurrent Spending **(G)**	Investment Demand **(I)**	Export Earnings **(E)**	Total Demand
Factors **R3**	Value-Added							Total Factor Income
Households **R4**			Factor Payments to households		Social Transfers		Foreign Remittance	Total Households Income
Government **R5**		Sales Taxes and Import Tariffs		Direct Taxes			Foreign Grants and Loans	Government Income
Savings and Investment **R6**				Private Savings	Fiscal Surplus		Current Account Balance	Total Savings
Rest of the World		Import Payments (M)						Foreign Exchange Outflow
Total	Gross Output	Total Supply	Total Factor Spending	Total Household Spending	Government Expenditure	Total Investment Spending	Foreign Exchange Inflow	

Income Columns